

CLAIMS

1. A method of transferring data from a network to a host using a network analyser card, the method comprising:
  - at the network analyser, receiving a plurality of data frames from a network link;
  - adding a descriptor to the or each frame, the descriptor including data about the frame; and,
  - transferring the or each data frame and their attached descriptor to a host memory.
2. A method according to claim 1, wherein the descriptor includes a field indicative of the length of the data frame to which it is attached.
3. A method according to claim 1 or 2, wherein the descriptor includes a field indicative of the order in which the data frame to which the descriptor is attached was received with respect to other received data frames.
4. A method according to any of claims 1 to 3, wherein the descriptor includes a field indicative of the channel from which the data frame to which the descriptor is attached was received.
5. A method according to any of claims 1 to 4, in which for a data frame, data indicative of one or more of:
  - the length of the data frame;
  - the channel from which it was received; and,
  - the order in which it was received with respect to other received data frames, is stored in the host memory.
6. A method according to any of claims 1 to 5, in which offset pointers are stored in the host memory indicative of

where corresponding stored data packets start in the host memory.

7. A method according to any of claims 1 to 6, in which the data is transferred to a region of host memory directly accessible to a host application.

8. A method of transferring multi-channel data received from a network to a host using a network analyser card, the network analyser card comprising: a receiver for receiving plural data frames from a network link on a first channel and a receiver for receiving plural data frames from the network link on a second channel; a descriptor adder configured and arranged to add a descriptor to at least some of the data frames received on the first channel and a descriptor adder configured and arranged to add a descriptor to at least some of the data frames received on the second channel, the descriptors including data about the data frame to which it is attached, the method comprising:

receiving data from first and second channels on the receivers of the network analyser card; and,

adding an indicator in the descriptor associated with received data frames indicative of the next channel on which a data frame was received, whereby when stored in an associated host memory said indicators can be used to merge data from said first and second channels in a desired order.

9. A network analyser card, the card comprising:

a receiver for receiving plural data frames from a network link; and,

a descriptor adder configured and arranged to add a descriptor to at least some of the received data frames,

the descriptor including data about the data frame to which it is attached for use in processing of the data frame.

10. A network analyser card according to claim 8, wherein the descriptor adder is configured such that the descriptor includes a field for data indicative of the length of the data frame to which it is attached.

11. A network analyser card according to claim 9 or 10, comprising:

an input buffer upstream with respect to the descriptor adder, the input buffer being configured and arranged to receive and temporarily store plural data frames from the network link.

12. A network analyser card according to any of claims 8 to 10, wherein the descriptor adder is configured such that the descriptor includes a field for a timestamp.

13. A network analyser card according to claim 12, wherein the timestamp has a variable format

14. A network analyser card according to any of claims 8 to 12, the network analyser card comprising:

a packet buffer arranged to receive and store data packets from the receiver.

15. A network analyser according to claim 14, comprising an input buffer at an input to the packet buffer and an output buffer at an output to the packet buffer.

16. A network analyser according to claim 15, arranged and configured to couple data packets from the input buffer to the output buffer via the packet buffer in dependence on a

set of conditions relating to the capacity and/or level of fullness of at least one of the packet buffer, the input buffer and the output buffer.

17. A network analyser card according to claim 16, configured and arranged such that in use data is transferred from the packet buffer to the packet buffer output buffer when the following conditions are satisfied:

- (a) packet buffer is determined to be not empty  
AND
- (b) (input buffer is determined to be not full) OR  
(packet buffer is determined to be full)  
AND
- (c) output buffer is determined to be not full.

18. A network analyser card according to claim 17, in which whether or not the packet buffer is determined to be full or not full is determined by an upper threshold and a lower threshold, respectively.

19. A network analyser card according to claim 18, in which the upper and lower thresholds are variable to control data input to and output from the packet buffer.

20. A network analyser card according to any of claims 15 to 19, comprising a bandwidth controller, arranged and configured to force a received data frame to be dropped when one or more criteria are satisfied.

21. A network analyser card according to claim 20, in which the bandwidth controller is implemented in hardware.

22. A network analyser card according to any of claims 8 to 21, in which the descriptor includes data indicative of one or more of the channel from which the data frame was received, the time at which the data frame was received, whether or not the data frame contains any data errors, the network protocol for the data frame and whether or not the next received data frame was received on the same channel as the present data frame.
23. A network analyser card for connection to a host computer, the network analyser card comprising;
- a receiver comprising an input buffer for receiving data frames from a network to which the host is connected;
  - a meta data insertion unit for attaching meta data to each data frame, the meta data relating to parameters of the data frame; and,
  - an output generator for transferring data frames and attached meta data to a host buffer associated with the host, in dependence on the meta data attached to the data frames.
24. A network analyser card according to any of claims 9 to 23, wherein the receiver and the descriptor adder are implemented in hardware.
25. A network analyser card according to claim 24, in which the hardware is selected from one or more application specific integrated circuits and one or more field programmable gate arrays.
26. A network analyser card, the card comprising:
- a first receiver for receiving plural data frames from a network link on a first channel; and,

a second receiver for receiving plural data frames from the network link on a second channel;

a first descriptor adder configured and arranged to add a descriptor to at least some of the received data frames from the first channel, the descriptor including data about the data frame to which it is attached for use in processing of the data frame;

a second descriptor adder configured and arranged to add a descriptor to at least some of the received data frames from the second channel, the descriptor including data about the data frame to which it is attached for use in processing of the data frame; wherein the first and second descriptor adders are configured and arranged to add an indicator to the data frames received by each of the two receivers to enable merging of data from the channels in an associated host.

27. A network analyser according to claim 26, in which the indicator is an indicator of the next channel on which a data frame was received.

28. A host for connection to a network, the host comprising:

a network analyser card according to any of claims 9 to 27;

a central processing unit; and,

a memory to receive and store data packets received from the network, the host being arranged such that the central processing unit is not interrupted when every data packet is received in the memory from the network analyser card.

29. A host according to claim 28, comprising a network analyser card according to any of claims 9 to 28.

30. A host according to claim 28 or 29, in which the network analyser card is arranged and configured to transfer data packets to a region of the host memory directly accessible to a host application.

31. A method of navigating through a memory in which data packets are stored, at least some of the data packets including a descriptor containing information about the data packet with which it is associated, the method comprising:

reading the descriptor of a first data packet to obtain information about the first data packet; and,

in dependence on said information, accessing a subsequent data packet.

32. A method according to claim 31, wherein when reading the descriptor of the first data packet, information about the length of the first data packet is obtained, the method comprising:

using knowledge of the length of the first data packet to locate a subsequent data packet in the memory.

33. A method according to claim 31 or 32, wherein when said memory is a host memory of a network analyser, the data packets are stored in regions of the host memory corresponding to channels from which the data was received by the host from a network to which the network analyser is connected, the method comprising:

when reading the descriptor of the first data packet, obtaining information about the channel from which the data was received by the host.

34. A method according to claim 35, comprising reading a Next Channel Indicator bit stored in the descriptor and accessing a subsequent data packet in dependence on the Next Channel Indicator bit.

35. A method of creating a merged data stream in a network analyser using data stored in regions of a host memory of the network analyser, the regions corresponding to channels from which the data was received by the host from a network to which the network analyser is connected, the merged data stream comprising data from at least two channels merged in a desired order, the method comprising:

reading from a first region of the host memory data of a first data packet from a first channel;

reading a descriptor associated with the first data packet, the descriptor containing an indicator of the next channel to be accessed; and,

in dependence on the indicator, reading from another region of the host memory data of a data packet from the next channel.

36. A method according to claim 35, comprising reading a Next Channel Indicator bit stored in said descriptor and accessing a subsequent data packet from a next channel in dependence on the Next Channel Indicator bit.

37. A method according to claim 35 or 36, in which the next channel is a different channel to the first channel.

38. A method according to any of claims 35 to 37, in which the location of data packets in the host memory is stored in an offset list containing a list of offsets used for navigation through the host memory.

39.. A method of creating an offset list corresponding to memory addresses of data packets stored in regions of a host memory of a network analyser, the regions corresponding to channels from which data packets were received by the host from a network to which the network analyser is connected, the method comprising:

as data packets are received in the host memory, in dependence on an indicator associated with each data packet, generating an offset indicative of the location within the memory of a subsequent data packet; and,

writing said offset to a region of the host memory.

40. A host for connection to a network, the host comprising a network analyser card, a memory and a central processing unit, wherein the network analyser card is arranged and configured to receive data frames from the network and comprises a hardware component configured to cause a received frame to be dropped in dependence on the amount of data stored in the host memory and/or a memory provided on the network analyser card.

41. A host according to claim 40, wherein the network analyser card is arranged and configured to add a descriptor to received data frames, the descriptor including a hardware-generated indicator for use in determination of the order of receipt of a data frame with respect to other received data frames.

42. A host according to claim 40 and 41, in which the network analyser card is arranged and configured to add a timestamp to received data frames.

43. A host according to any of claims 40 to 42, in which the network analyser card is arranged and configured to

transfer data packets to an area of the host memory directly accessible to an application running on the host.

44. A host according to any of claims 40 to 43, in which the network analyser card is arranged and configured to transfer data packets to the host memory, wherein the number of data packets transferred in a single data transfer operation is variable.

45. A host according to any of claims 40 to 43, in which the host central processing unit is interrupted due to receipt of data packets in the host memory when a sufficient number of data packets to fill a section of the host memory has been received or if no further packets have been received in the host memory in a determined time period.

46. In a host for connection to a network, the host comprising a network analyser card for receiving data frames from the network, the network analyser card being arranged and configured to add a descriptor to received data frames containing data about the data frame to which it is added for use in processing of the data frame, a host memory and a central processing unit associated with the host, the provision of one or more of the following features:

(a) the network analyser card comprising a hardware component configured to cause a received frame to be dropped in accordance with criteria relating to the amount of data stored in the host memory and/or a memory provided on the network analyser card;

(b) the descriptor including a hardware-generated indicator for use in determination of the order of receipt of a data frame with respect to other received data frames;

- (c) the network analyser card being arranged and configured to add a timestamp to received data frames;
- (d) the network analyser card being arranged to transfer data packets to an area of the host memory directly accessible to an application running on the host;
- (e) the network analyser card being arranged and configured to transfer data packets to the host memory, wherein the number of data packets transferred in a single data transfer operation is variable; and,
- (f) the host central processing unit being interrupted due to receipt of data packets in the host memory when a sufficient number of data packets to fill a section of the host memory has been received or if no further packets have been received in the host memory in a determined time period.